Prevent-iON® Detection Technology

R-THIMG

User manual for thermal imaging detector and fire prevention: installation, wiring, Prevent-iON and Modbus RTU integration, and relay configuration.

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INFRASENSING

Contents

1 Introduction

The R-THIMG is a specialized, compact thermal imaging detector engineered exclusively for dedicated fire detection applications. Utilizing an advanced thermal matrix, the device delivers precise and comprehensive monitoring across 768 discrete temperature measurement points. This multi-point sensing approach allows the system to analyze localized thermal variations in real time, detecting early signs of heat buildup well before traditional smoke or flame sensors trigger an alert.

To streamline monitoring and incident response, the unit organizes its data into two distinct reporting zones. This dual-zone capability enables facility operators to isolate elevated temperatures quickly and identify the precise origin of potential fire hazards. The package includes one C-THIMG-SM unit to establish your base detection setup, while additional C-THIMG-SM units are available for purchase separately to scale coverage according to the requirements of your environment.

2 All about R-THIMG Detector

2.1 Detector Metrics

R-THIMG SPECIFICATION

Cylindrical hub	A standalone hub that supports up to 2 cylindrical detector
Temperature measurement range:	-40°C to 125°C (-40°F to 257°F)
Temperature accuracy:	±0.48°C (±0.86 °F)
Relative humidity measurement range:	0 to 100% RH
Relative humidity accuracy:	2% RH

C-THIMG-SM SPECIFICATION

FIR target temperature range	-40°C to 300°C (-40°F to 572°F)
FIR temperature accuracy	±1°C (±1.8°F)
FIR temperature scanning	4 seconds
FIR Field of view (FOV)	110° horizontal (wide) 75° vertical
FIR max object distance	Up to 5m
FIR resolution	32x24 pixels

2.2 Technical Specification

Relay output	3 (normally open)
Relay switching current and voltage	Max. 30 VDC / 250 VAC, max. 2 A / 0.5 A
Input voltage	12-24 VDC ±10%
Detector power usage	612-744 mw (with 2 cylindrical detectors connected)
Protocol	Modbus RTU over RS485 Integration with Base Unit over RJ45 (serial data)
Detector connectivity	Two male connectors for cylindrical detectors

2.3 Environmental Specifications

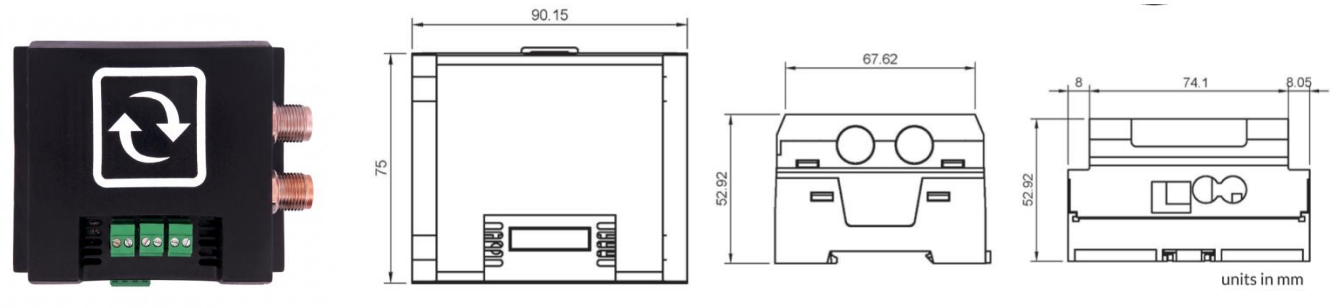
R-THIMG ENVIRONMENTAL SPECIFICATION

Operating temperature range	0 °C to + 75 °C (32 °F to +167 °F)
Humidity (Operating and storage)	<90% RH (non-condensating)

C-THIMG-SM ENVIRONMENTAL SPECIFICATION

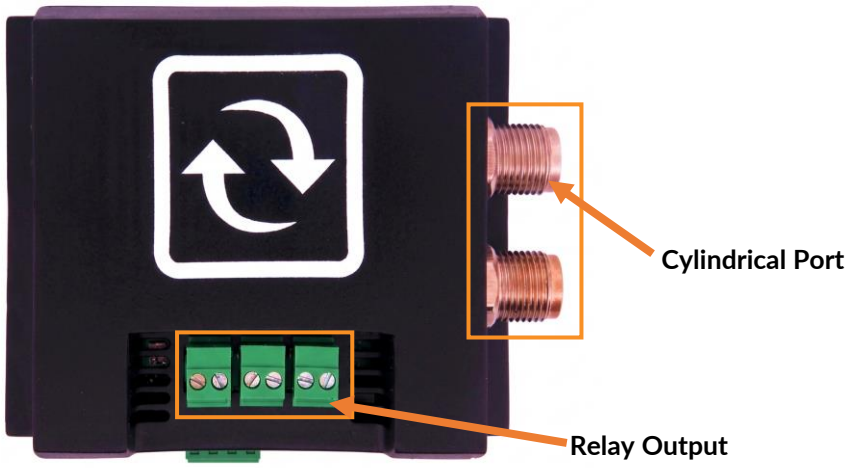
Operating temperature range	-40°C to +85°C (-40°F to 185°F)
Humidity (Operating and storage)	<90% RH (non-condensating)

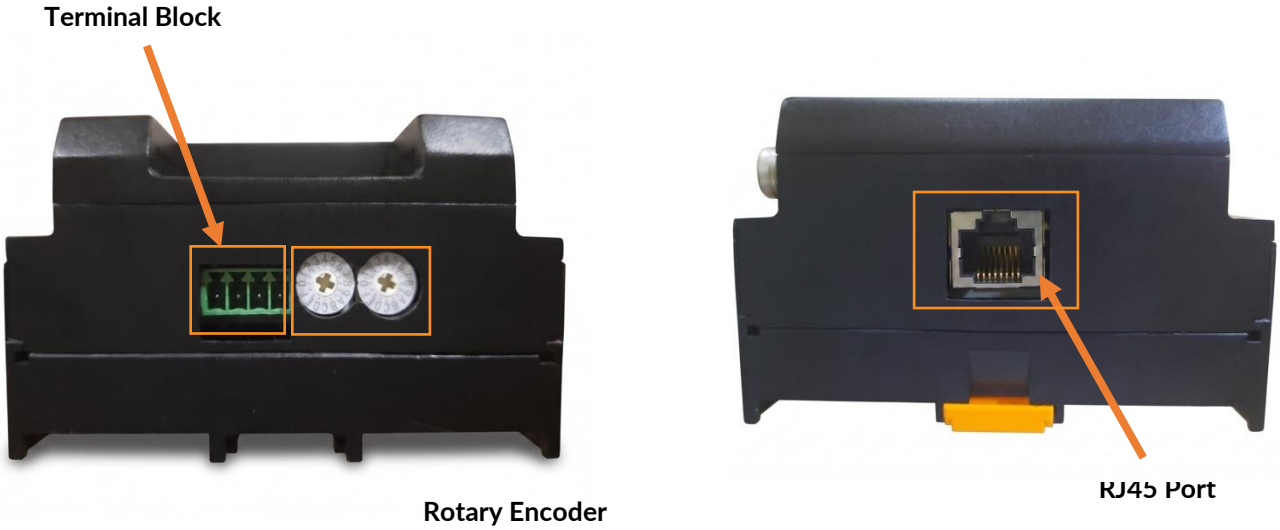
2.4 Physical Specifications



Detector enclosure	Plastic industrial grade enclosure
Detector cable	200 m (656.17 ft) detecting cable. Custom cable lengths of 5 m (16.40 ft) or 20 m (65.62 ft) are available on request (sold separately).
Mounting option	DIN rail
Dimensions: **R-THIMG / C-THIMG-SM**	90.15mm (3.55”) x 75 mm (2.95”) x 52.92 mm (2.08”) / L: 27.5mm (1.08”), Ø: 26mm (1.02”)
Weight: **R-THIMG / C-THIMG-SM**	118 g (0.26lb) / 70g (0.17lbs)

2.5 Exterior Features





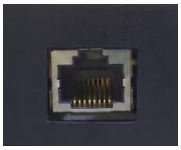
Cylindrical Port – serves as connection for cylindrical sensors (C-THIMG-SM / C-ENV-THUM / C-GAS-VOC)

Terminal Block – This block comprises terminals for various connections :

- Terminal 1: 12 to 24V DC power input (+ polarity)
- Terminal 4: Ground (GND) (- polarity)

Relay Output - It allows for direct hand-off and signal bridging to legacy Building Management Systems (BMS), Fire Alarm Control Panels (FACP), or Industrial Control Systems via simple contact-closure.

Rotary Encoder – The rotary encoder is a user interface component that can be rotated to input or adjust settings, facilitating user interactions with the sensor's configuration. With the user settable address out of 256 combinations.



RJ45 Port– This port serves as the communication with the Base Unit

3 System Architecture

The R-THIMG operates on a high-precision, multi-layered architecture engineered for continuous, real-time thermal monitoring and fire detection.

Utilizing advanced processing algorithms alongside connected C-THIMG-SM sensor modules, the device performs continuous heat analysis and automated background system diagnostics. This architecture enables comprehensive thermal surveillance across 768 discrete temperature measurement points, categorized into two distinct reporting zones.

For broader facility integration, the R-THIMG equipped with onboard dry-contact relays to directly trigger local alarms, strobes, or emergency shut-off valves. Additionally, integrated communication protocols—such as Modbus RTU allow the detector to seamlessly stream precise location coordinates, system health metrics, and alarm logs directly to your Building Management System (BMS) or Network Management System (NMS).

4 Setup & Implementation

4.1 Preparation

Prior to initiating the installation procedure, it is crucial to ensure that you have all the essential materials and devices readily available.

- Devices Needed
  - R-THIMG

  - Cylindrical Sensor (C-THIMG-SM)

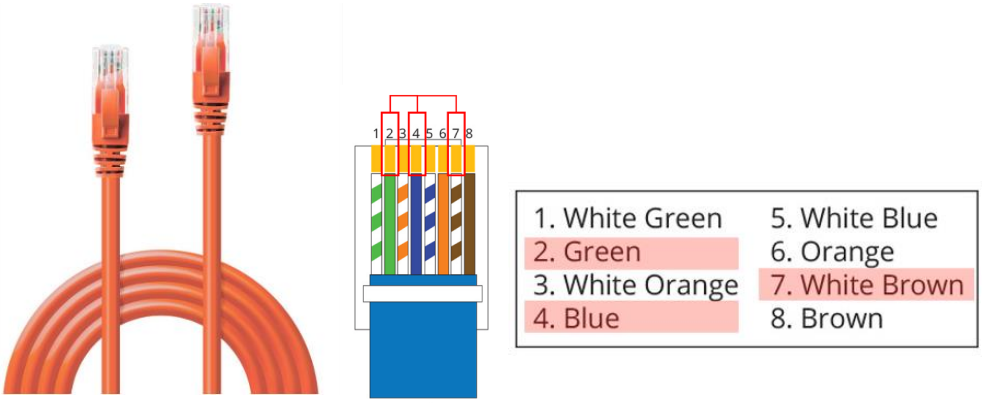
    Cylindrical sensors are probes that connect to the circular connectors labeled as ports seen in the R-THIMG. One example is the C-THIMG-SM. It enables the user of R-THIMG for continuous thermal monitoring, it identifies localized heat anomalies, phase imbalances, or early fire risks before visible smoke or flames appear.

- Tools Needed
  - BASE-Unit

    To power the R-THIMG, it can be connected to InfraSensing BASEunit via its Ethernet port.

- Modified RJ45 Cables

  R-THIMG can be connected to our BASE unit to power it on. There is a need to connect it via RJ45 cables.



- AX-USB-RJ45

  If detector is to be accessed via Prevent-iON Mobile application, there is a need to utilized InfraSensing AX-USB-RJ45. This app requires a compatible android phone

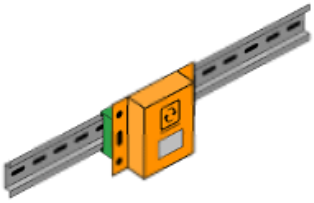
- If accessed via Modbus RTU, there is a need for a USB-Serial adapter. It requires Modbus RTU software and 24V power supply to the detector.

- Things to check
  - Ensure that there is no visible damage on any of the devices
  - Check the functionality of all network cables and ensure that they are free from any defects that could affect the quality of results.
  - Prepare the location or area where you intend to place or install the devices.

Adhering to these guidelines will contribute to a successful and trouble-free installation process.

4.2 Mounting Guidelines

Our sensors offer flexible mounting solutions, providing you with various options for installation:

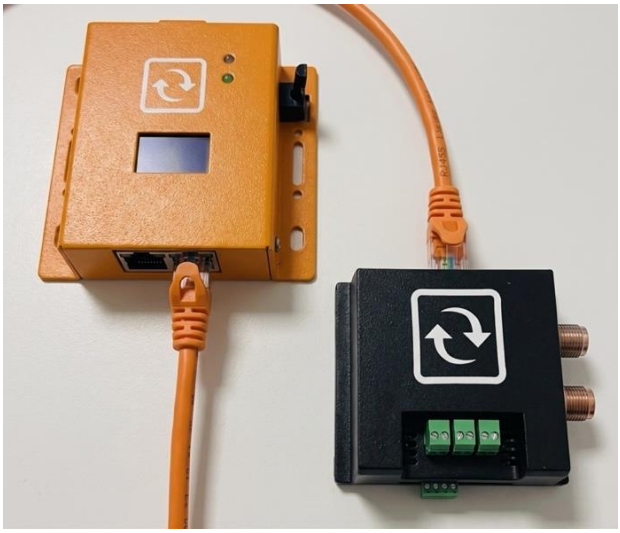


DIN Rail: Ideal for secure, space efficient mounting with compatible enclosures or control panels.

4.3 Powering-up the Detector

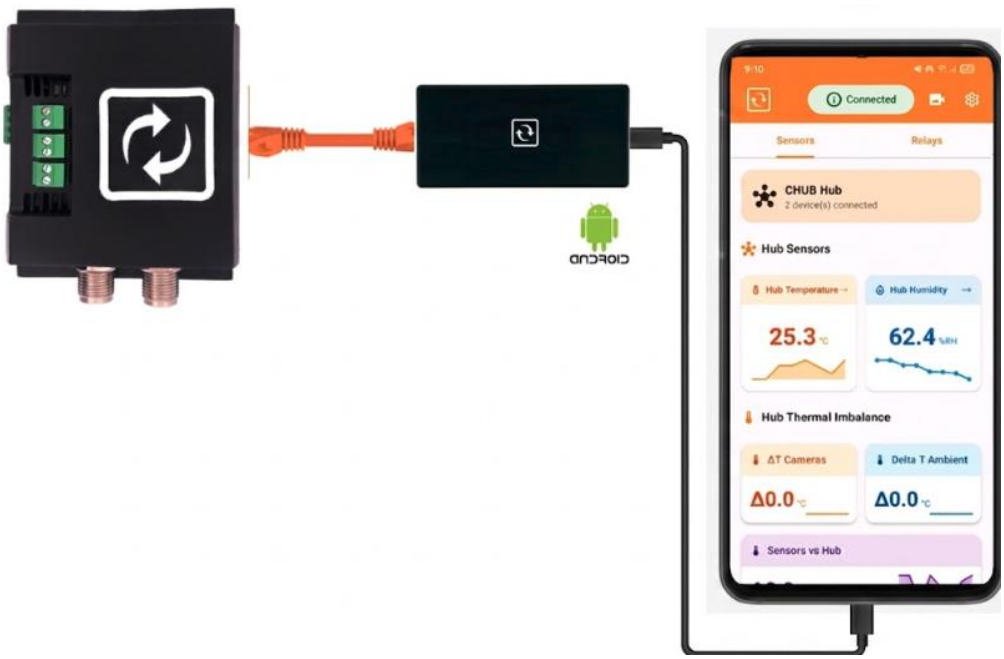
4.3.1 Connecting to the Base Unit

The R-THIMG draws electrical power directly from the base unit using a standard RJ45 cable connected to the designated port at the bottom of the base unit. Note that the base unit serves exclusively as a power source in this configuration; sensor readings and telemetry cannot be accessed via its web interface. To view and monitor sensor data, utilize either the RS485 interface or the Companion App.



4.4 Starting up using AX-USB-RJ45

The R-THIMG unit can draw electrical power directly from a connected mobile device using the AX-USB-RJ45 communication adapter. Connecting the unit to a compatible smartphone or tablet delivers the direct current required to boot, initialize, and operate the sensor's internal circuitry. This bus-powered setup removes the requirement for dedicated external power supplies or a primary base unit connection, allowing field technicians to perform routine inspections, status verifications, and sensor calibrations directly on site without connecting to a local 12–24V DC power rail.

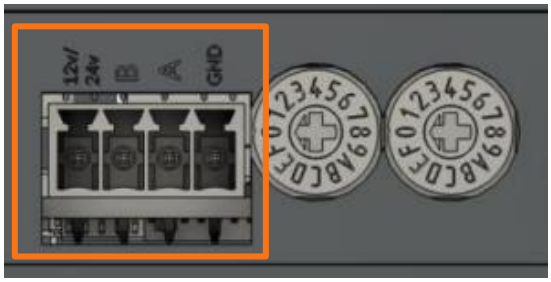


Important Note:

To ensure successful power delivery, the mobile device and its connecting USB cable must support **USB On-The-Go (OTG) / reverse charging** functionality. This capability allows the mobile device to act as a power host, transmitting the required power through the AX-USB-RJ45 adapter to energize the R-LEAK-LOC sensor.

4.4.1 Starting up via Modbus Terminal Blocks

The R-THIMG is a standalone sensor that can be powered via a direct current (DC) supply, accommodating voltages from 12V to 24V.



Terminal Block – This block comprises terminals for various connections :

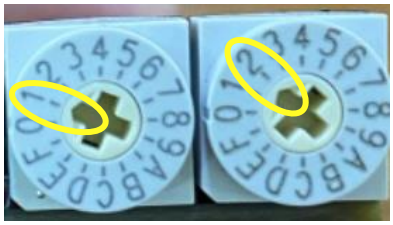
- Terminal 1: 12 to 24V DC power input (+ polarity)
- Terminal 4: Ground (GND) (- polarity)

A **12V DC power source** is highly recommended for optimal performance and reliable operation of the R-LEAK-LOC sensor.

To set up the Slave ID address please refer to the image below. Please note that there is a pointer which corresponds to the value that it is set to.

Value A	Value B	Hex	→	SLAVE ID

Example:



1	2	Hex	→	12

Important Note:
The combination of **0 and 0** or **F and F** is not functional. Please ensure these configurations are avoided to maintain proper operations.

By default, the rotary switch is set to Hexadecimal (Hex). However, it can be manually converted to Decimal, depending on your preference or system requirements.

4.4.2 Default Modbus Connection Setting

As a standalone device below are the default thresholds and configurations

METRIC	VALUE
Baud Rate	1200
Data Bits	8
Parity	None
Stop Bit	1

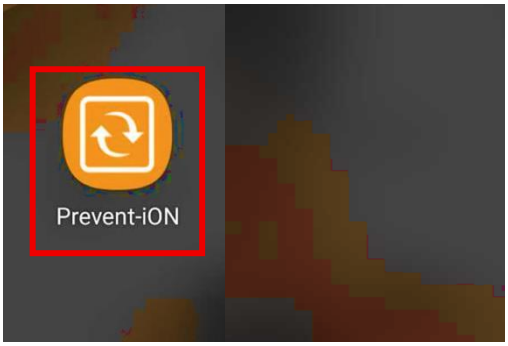
4.5 Accessing via Prevent-iON App

The R-THIMG is engineered for high-precision temperature monitoring and continuous real-time thermal imaging, enabling early hazard detection and proactive risk mitigation. System management is streamlined through the Prevent-iON Mobile Application, which offers an intuitive platform for efficient operational monitoring and simplified device configuration.

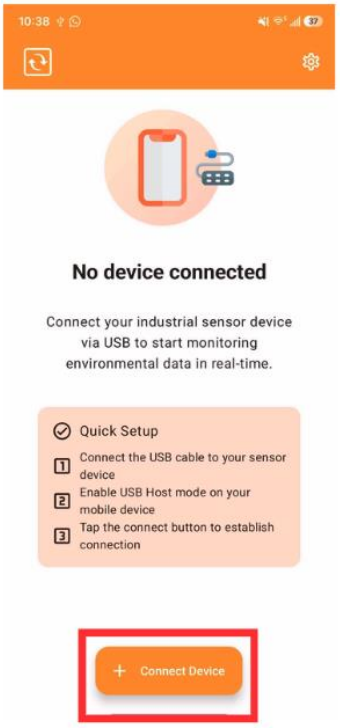
The AX-USB-RJ45 communication adapter establishes a direct link between the R-THIMG and a compatible Android device. This interface facilitates on-site configuration, field diagnostics, and real-time telemetry monitoring via a mobile device.

4.5.1 Configuring C-THIMG-SM on R-THIMG

1. Launch the **Prevent-iON** application on your mobile device.

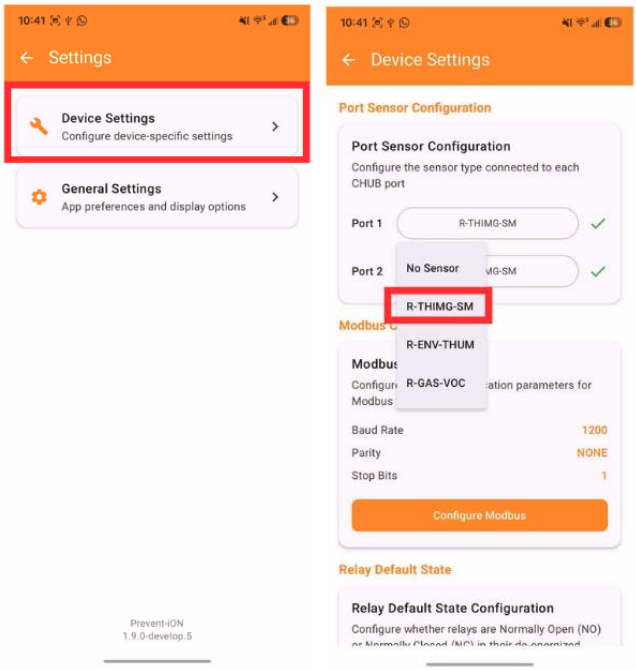


2. The app will launch and you will need to click on the “Connect” button.

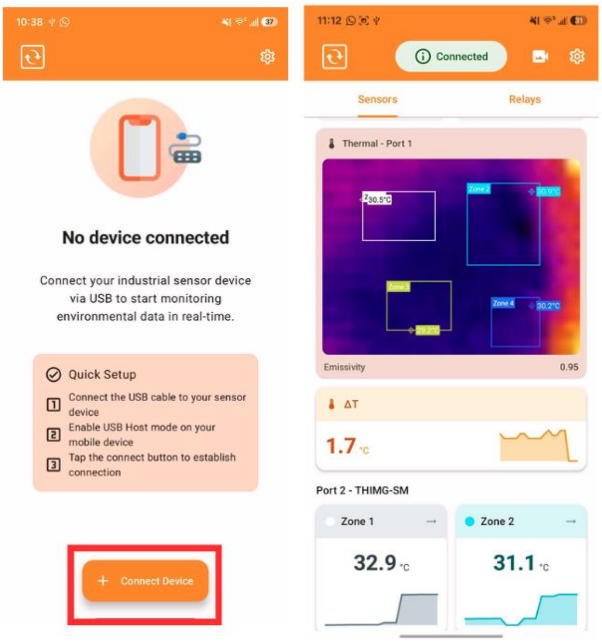


3. Wait for the status to change to “Connected”, after that click on the settings icon on the upper right of your screen. Navigate to the home page and select **Open Settings**.

4. Locate the **Port Sensor Configuration** section and choose R-THIMG-SM for the ports where your C-THIMG-SM is connected. After choosing you will need to **POWER-CYCLE** the R-THIMG-XX to save the port configuration.

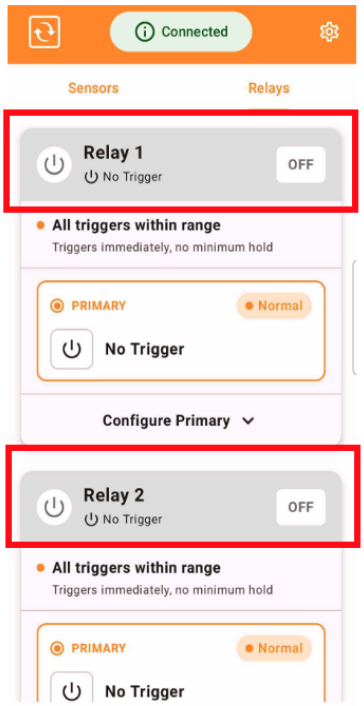


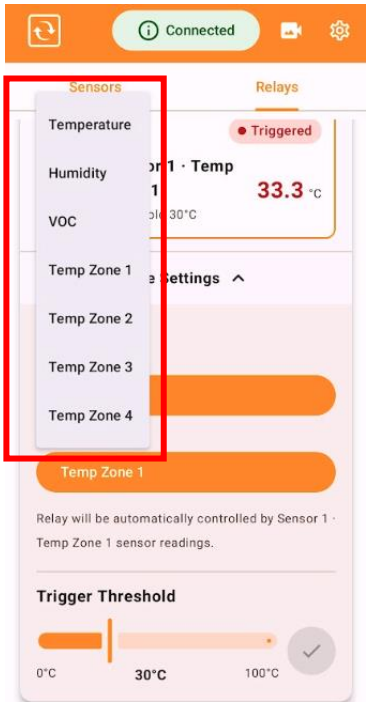
5. After you restart the sensor you will need to click on “Connect” again.



4.5.2 Configuring R-THIMG relays

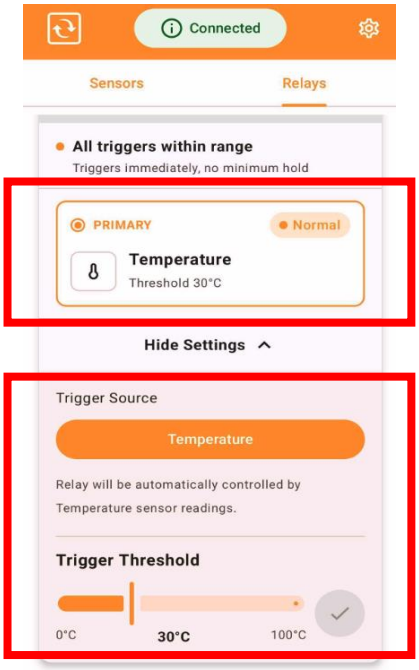
1. Using the Prevent-iON app, under the home page, relays tab, you may configure the relay in which how it is triggered. There are multiple options of what trigger source should be applied for relay to be triggered. By default, there is no trigger source given. Setting Trigger sources can be seen by clicking “Configure Primary” then choosing “Trigger Source”. There, multiple options can be seen.





2. For what trigger source to be applied, there are multiple options.
   The following can be utilized:
   - Temperature
   - Humidity
   - Temp Zone 1
   - Temp Zone 2
   - Temp Zone 3
   - Temp Zone 4

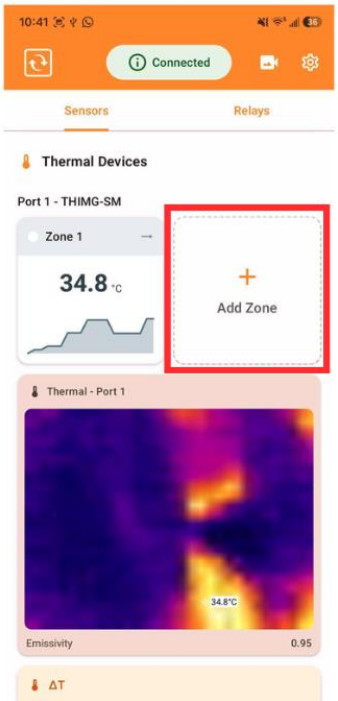
Trigger thresholds can be applied to what certain value is needed for relays to be activated. This is evident for all trigger sources.



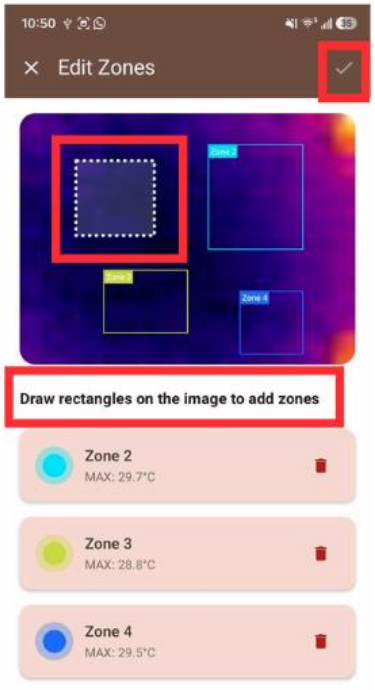
4.6 Configuring thermal zones via Prevent-iON app

It is best to add zones in the Prevent-iON app because you would be able to pin point the zones that you would like to monitor. It's easier and effective.

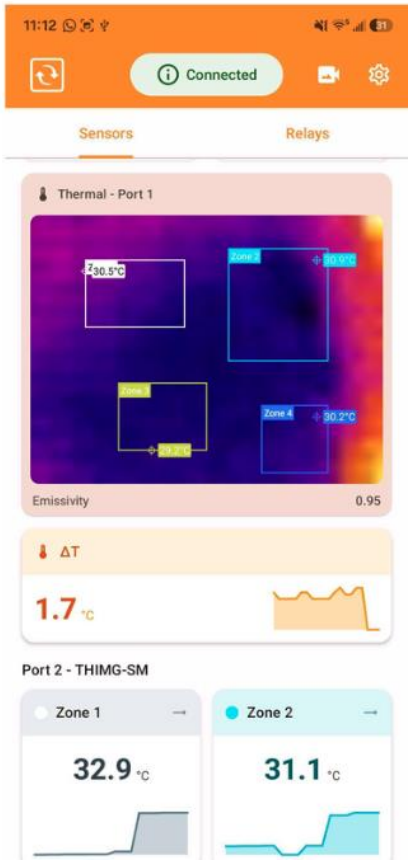
1. To add zones simply scroll down to your thermal devices and click on "Add zone".



2. Inside the edit zones option you can simply draw rectangles in the image to add zones and click on the check mark to save the zone that you have drawn.

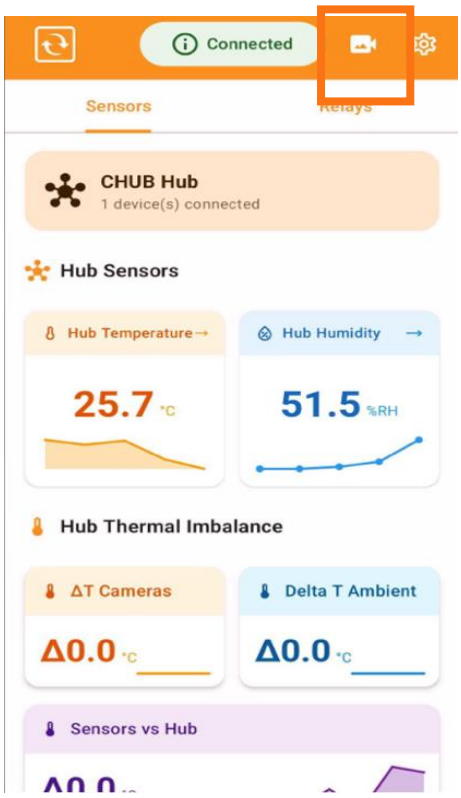


3. After saving you would be able to monitor the zones that you have added in the main page of the app.

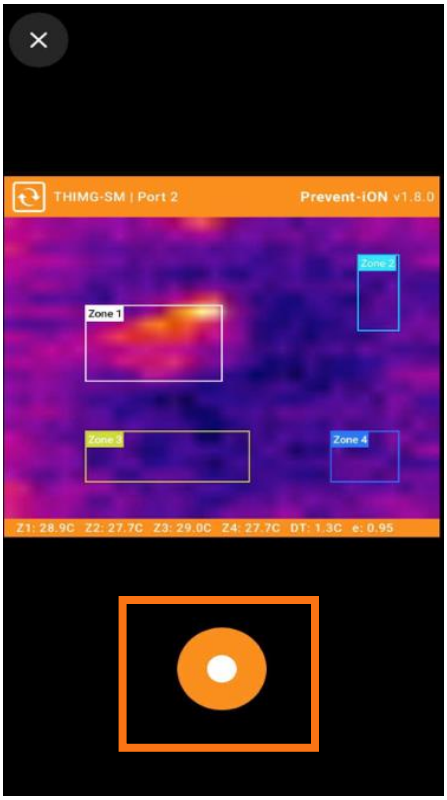


4.6.1 Record thermography monitoring event via Prevent-iON app

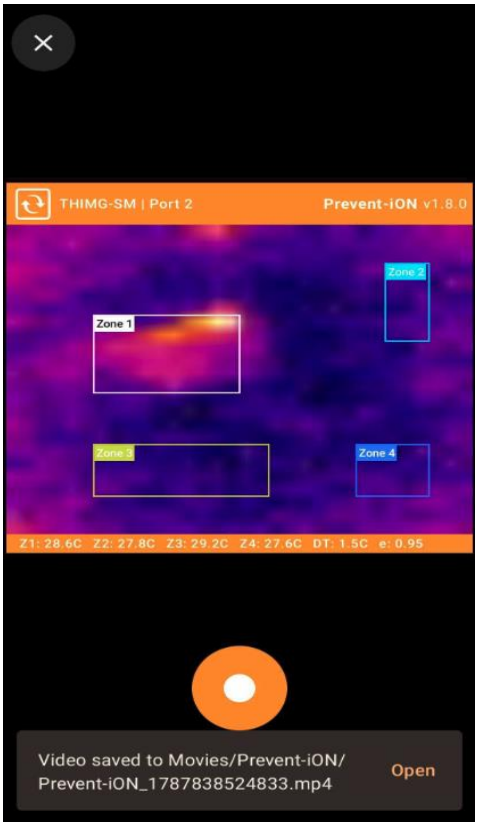
1. Event recording is supported for the C-THIMG-SM sensor. Navigate to the home page and click the video icon located on the right side of the panel to access the dedicated recording view.



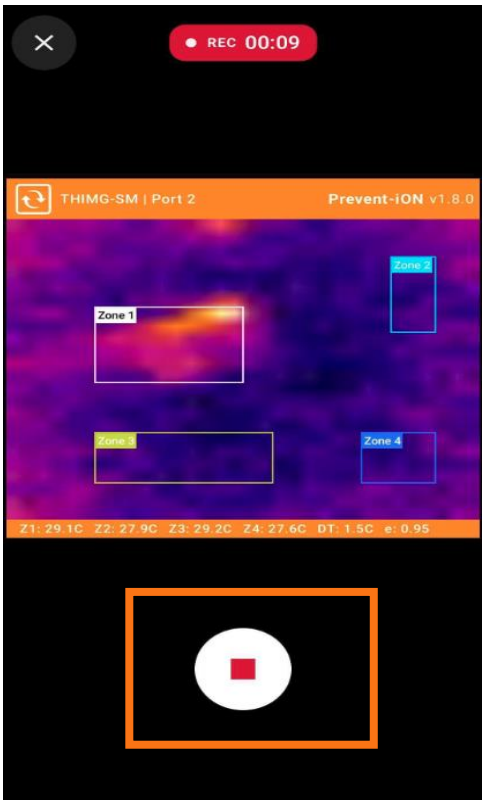
2. Click **Record** to start capturing video.



3. Active video recording is indicated by a timer displayed at the top of the screen. To stop recording, click the record button again



4. The target file directory where videos are saved on the Android device is displayed at the bottom of the screen.



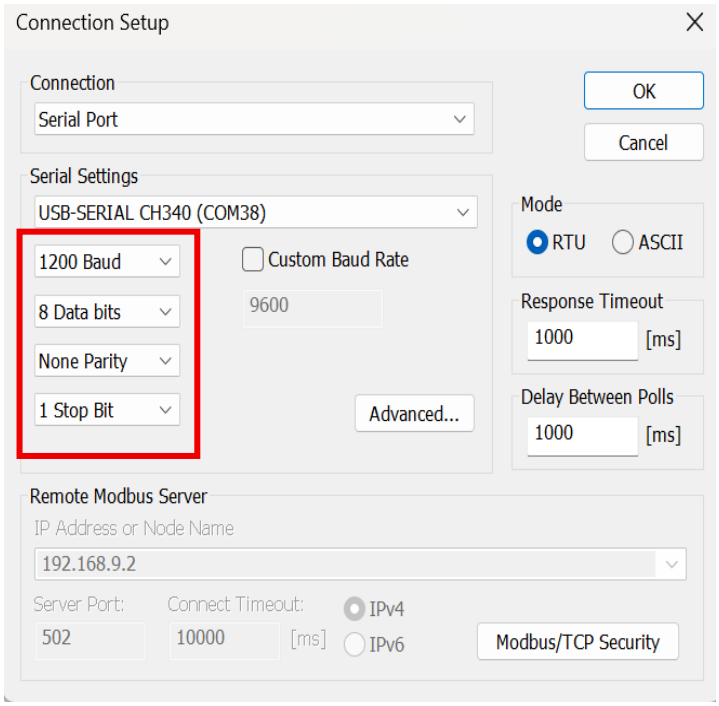
4.7 Accessing via Modbus RTU

4.7.1 Configuring C-THIMG-SM on R-THIMG via Modbus RTU

Upon connecting C-THIMG-XX to a port on the R-THIMG, there is a need to define the cylindrical sensor type to enable access dedicated features of C-THIMG-XX sensors like that of configuring thermal zones. Below shows a step-by-step on how to setup C-THIMG-XX.

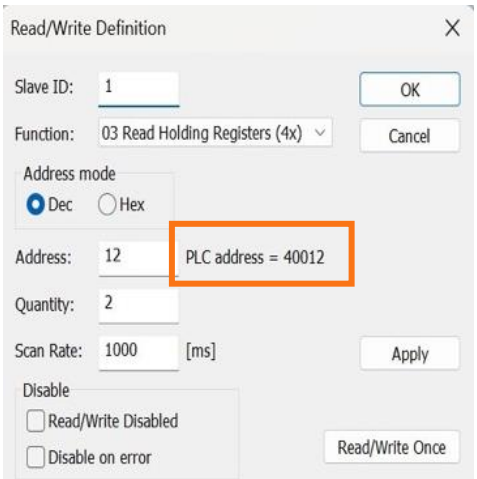
For demonstration purposes, Modbus poll application will be used in succeeding steps.

1. Launch your known Modbus RTU software on your computer. Navigate to the Connection menu > select Connect, and configure the appropriate communication parameters show in **Section 4.3.4** before clicking OK to establish the active Modbus connection.

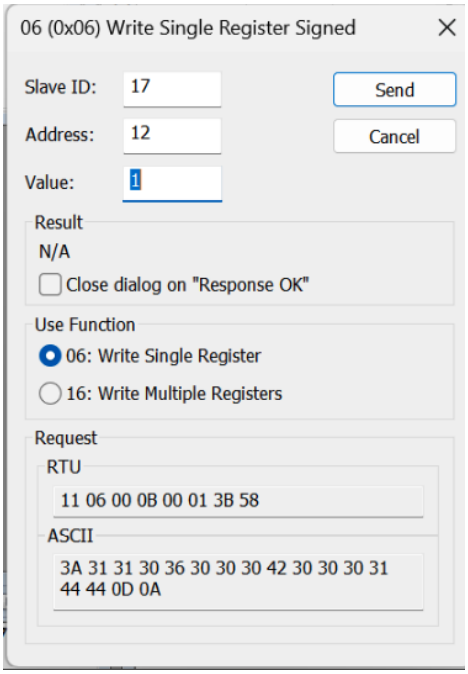


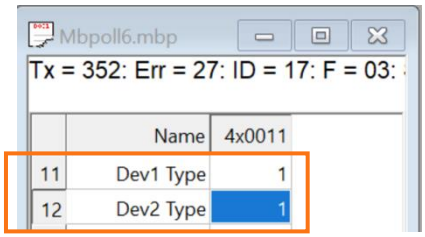
2. Create a new modbus connection to access 40011 and 40012 registers. Depending on the port in which the C-THIMG-SM is connected, enable the Read/Write settings and ensure that the PLC address matches exactly with the Modbus register assigned to the defining cylindrical sensor on port.

Modbus Register Address	Description	Register Type	Data Type
40011	Device 1 Type	Read/Write	uint8
40012	Device 2 Type	Read/Write	uint8



3. Double-click the cell in Modbus Poll and set the value to 1 to indicate that cylindrical sensor connected is that of C-THIMG-SM. Afterwards, to save the configuration, there is a need to power cycle the R-THIMG. Disconnect and reconnect power connection. it will be visible that R-THIMG recognizes the C-THIMG-SM with a value of 1 in the register.





4.7.2 Default Relay State

The default relay state refers to the initial or resting position of a relay when no external power or signal is applied. This state is typically either normally open (NO) or normally closed (NC), indicating whether the Relay 1llows or interrupts the electrical circuit by default. The relays are set to Normally Open (NO) by default.

However, users can customize or adjust the relay state to suit the specific application needs. A power cycle is required after applying any changes or updates. This can be configured via modbus registers 40041, 40042, and 40043.

Status	Value
Normally Open	00
Normally Close	01

4.7.3 Assigning Relay Trigger Source

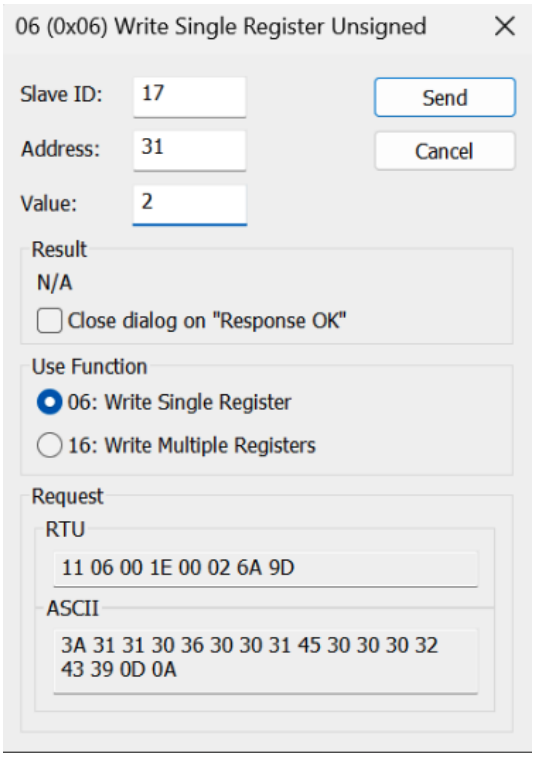
The user has multiple options to trigger relays depending on the source of what cylindrical sensor it is denoted by its port placement and what type it can be set based on its available values it provides. When using C-THIMG-SM, they have the option to set the trigger on the following: Temp zone 1-4.

When both ports of R-THIMG-SM are connected with C-THIMG-SMs, additional trigger types can be considered which are the following: Thermal Imbalance, Imbalance against Ambient temperature, Highest temperature.

To change or assign the relay trigger source, follow the steps below:
In this application, we'll be assigning the Temp zone 1 Port 2 for Relay 1 as an example.

1. Locate the Modbus register for the Relay Trigger Source and Relay Trigger Type, as well as the data for the metric you wish to assign. (Modbus address is provided below)
   a. Relay 1 – Trigger Source: 40031
   b. Relay 2 – Trigger Source: 40032
   c. Relay 3 – Trigger Source: 40033
   d. Relay 1– Trigger Type: 40036
   e. Relay 2 – Trigger Type: 40037
   f. Relay 3 – Trigger Type: 40038

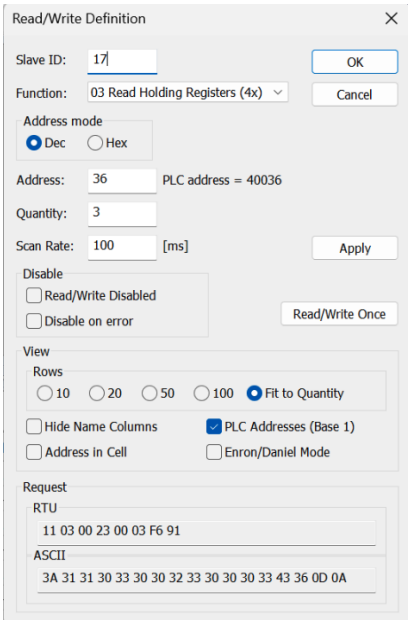
2. Make sure to set the data format to “Unsigned” and assign a name to the register.



3. To change the default trigger source, double-click on the value (please see image below). A “write” section will appear – update the “value” to 2, as 2 corresponds to Port 2 where the C-THIMG-SM is located.

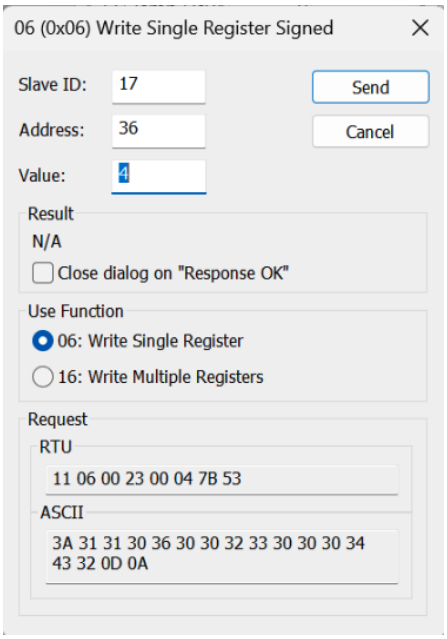
4. Click Send to apply the changes. After a few seconds, the value will update to 2, indicating that Relay 1's trigger source is now set to the cylindrical sensor connected at Port 2.

5. Proceed now to change the Relay Trigger Type. Make another Modbus window and configure its Read/Write settings and ensure that the PLC address matches exactly with the Modbus register assigned to Relay 1 both trigger source. In this case, start at address 40036 with a quantity of 3.



6. Make sure to set the data format to “Unsigned” and assign a name to the register like that of Step 3.

7. To state a trigger source type, double-click on the value (please see image below). A “write” section will appear – update the “value” to 4, as 4 corresponds to the connected C-THIMG-SM Temp Zone 1.



8. Similar steps from 1-8 can be applied in order to edit Relay 2 and Relay 3’s trigger source and trigger types by accessing their respective registers and applying value

corresponding to what is wanted by user configuration. Please see Modbus Table for comprehensive options for trigger source and trigger types.

Setting the Trigger threshold is needed after configuring trigger source and trigger types.

4.7.4 Assigning Relay Threshold

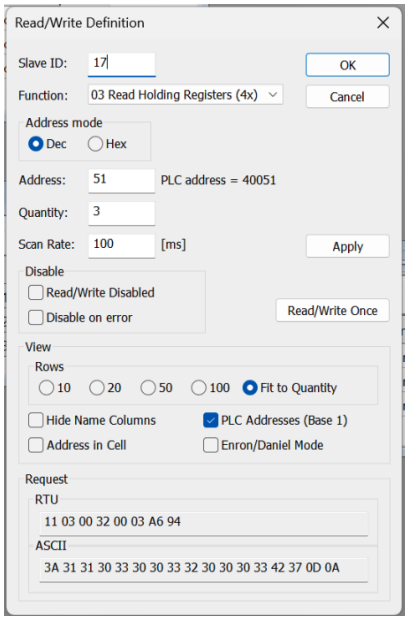
Assigning threshold value depends on the trigger type. For C-THIMG-SM, Temp Zone 1-4 is possible to be set threshold from a range of 0-100 of their respective unit. For example, 0-100 degrees Celsius for Temp Zone 1.

Additionally, for multiple C-THIMG-SM occupying both ports, the following can be set as threshold: Thermal Imbalance and Imbalance against Ambient temperature a range of 0-50 degrees Celsius; Highest temperature a range of 0-100 degrees Celsius.

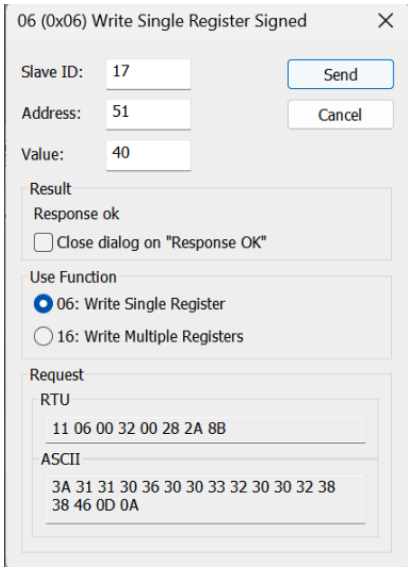
As a sample application, here are the following steps to set trigger threshold for what was configured earlier, Port 2, Temp Zone 1 trigger source and type.

1. Locate the Modbus register for the Relay Trigger Source and Relay Trigger Type, as well as the data for the metric you wish to assign. (Modbus address is provided below)
    a. Relay 1 – Trigger Threshold: 40051
    b. Relay 2 – Trigger Threshold: 40052
    c. Relay 3 – Trigger Threshold: 40053

2. Configure the Read/Write settings and ensure that the PLC address matches exactly with the Modbus register assigned to Relay 1 both trigger source. In this case, start at address 40051 with a quantity of 3.



3. Make sure to set the data format to “Unsigned” and assign a name to the register.
4. To apply a value for trigger threshold, double-click on the value (please see image below). A “write” section will appear – update the “value” to what is desired value to trigger relay. As an example, it is set to 40 which corresponds to 40 degrees celsius.



5. Click Send to apply the changes. After a few seconds, the value will update to 40 on the modbus register, indicating that Relay 1's trigger threshold is now set to the 40 degrees celsius on Temp zone 1 for cylindrical sensor connected at Port 2.

4.7.5 Modbus Table

Modbus Register Address	Description	Register Type	Data Type
40001	MB address	Read only	Uint8
40002	MB Parity	Read/write	Uint8
40003	MB Baudrate	Read/write	Uint8
40004	MB Stopbits	Read/write	Uint8

Modbus Register Address	Description	Register Type	Data Type	Information
40011	Dev 1 type	Read/write	Uint8	Dev type explanation 0 – No Sensor 1 – MLX camera
40012	Dev 2 type	Read/write	Uint8	
40021	Dev 1 status	Read/write	Uint8	Sensor status value 0 – Error 1 – Ok 2 – Not connected
40022	Dev 2 status	Read/write	Uint8	

Modbus Register Address	Description	Register Type	Data Type
1	Relay 1 Direct control	Read/write	Bit
2	Relay 2 Direct control	Read/write	Bit
3	Relay 3 Direct Control	Read/write	Bit
50	Reset all relays	Read/write	Bit

Modbus Register Address	Description	Register Type	Data Type	Information
40031	Relay 1 Trigger Source	Read/write	Uint8	0 – No sensor 1 – Sensor 1 2 – Sensor 2 5 – Internal sensor 6 – Multiple Sensors
40032	Relay 1 Trigger Source	Read/write	Uint8	
40033	Relay 1 Trigger Source	Read/write	Uint8	
40036	Relay 1 Trigger Type	Read/write	Uint8	Relay trigger Type 0 – No source/ direct 1 – Temperature 2 – Humidity 4 – Temp zone 1 5 – Temp zone 2 6 – Temp zone 3 7 – Temp zone 4 8 – Fault trigger
40037	Relay 2 Trigger Type	Read/write	Uint8	
40038	Relay 3 Trigger Type	Read/write	Uint8	
40041	Relay 1 Default state	Read/write	Uint8	Default status explanation 1 – NC 0 – NO
40042	Relay 2 Default state	Read/write	Uint8	
40043	Relay 3 Default state	Read/write	Uint8	
40051	Relay 1 Trigger Threshold	Read/write	Int16	
40052	Relay 2 Trigger Threshold	Read/write	Int16	
40053	Relay 3 Trigger Threshold	Read/write	Int16	

Modbus Register Address	Description	Register Type	Data Type	Information
30001	Fault Status	Read only	Float	Fault Type
30003	Temperature Internal	Read only	Float	In Celsius by default
30005	Humidity Internal	Read only	Float	In RH%

Modbus Register Address	Description	Register Type	Data Type
30240	Thermal imbalance all cameras	Read only	Uint8
30242	Thermal imbalance all cameras against ambient	Read only	Uint8
30244	Max Value all devices	Read only	Uint8

5 Document Control

VERSION	DATE	CHANGE
1	28 August 2026	Initial issue.